Overview

Mapping Southern Florida's Shallow-water Coral Ecosystems: An Implementation Plan

The Southern Florida Shallow-water Coral Ecosystem Mapping Implementation Plan (MIP) discusses the need to produce shallow-water (~0-40 m; 0-22 fm) benthic habitat and bathymetric maps of critical areas in southern Florida and moderate-depth (~40-200 m; 22-109 fm) bathymetric maps for all of Florida. The ~0-40 m depth regime generally represents where most hermatypic coral species are found and where most direct impacts from pollution and coastal development occur. The plan was developed with extensive input from over 90 representatives of state regulatory and management agencies, federal agencies, universities, and non-governmental organizations involved in the conservation and management of Florida's coral ecosystems.

Southern Florida's coral ecosystems are extensive. They extend from the Dry Tortugas in the Florida Keys as far north as St Lucie Inlet on the Atlantic Ocean coast and Tarpon Springs on the Gulf of Mexico coast. Using 10 fm (18 m) depth curves on nautical charts as a guide, southern Florida has as much as 84 percent (30,801 sq km) of 36,812 sq km of potential shallow-water (<10 fm; <18 m) coral ecosystems the tropical and subtropical U.S. Moreover, southern Florida's coral ecosystems contribute greatly to the regional economy. Coral ecosystem-related expenditures generated $4.4 billion in sales, income, and employment and created over 70,000 full-time and part-time jobs in the region during the recent 12-month periods when surveys were conducted.

Mapping Priorities

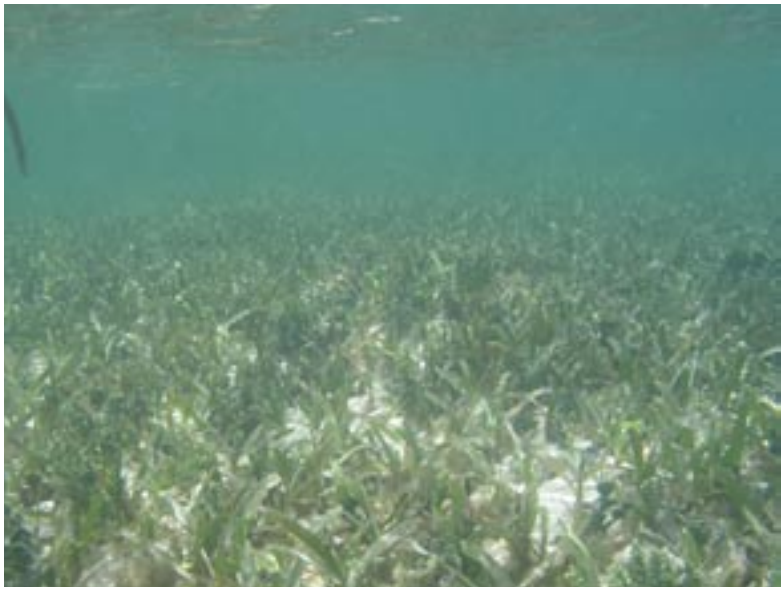
The MIP summarizes the map product needs of the southern Florida coral ecosystem conservation and management community. These needs include detailed, georeferenced, thematically accurate shallow-water benthic habitat and bathymetry maps. While considerable scientific interest and management requirements exist for coral ecosystems of the entire 30,801 sq km southern Florida region, priority areas were identified. Priority areas include the shallow-water coral ecosystems found in Martin, Broward, Palm Beach, and Miami-Dade Counties, Biscayne National Park, Tortugas Ecological Reserve, Dry Tortugas National Park, Florida Bay, and the Florida Keys National Marine Sanctuary (Figure 1). While considerable scientific and management interest exists in the West Florida Shelf, this area was considered to be a secondary priority area. As opportunities arise, targeted mapping activities will be conducted to characterize this area.

Figure 1. The yellow polygon delineates the approximately 13,000 sq km priority shallow-water benthic habitat mapping area of southern Florida.

Mapping Costs

Based on geographic priorities and costs, the MIP recommends developing maps of approximately 13,000 sq km of southern Florida's shallow-water coral ecosystems (Figure 1). The estimated cost to generate a detailed shallow-water benthic habitat map using high-resolution satellite or similar imagery is approximately $4.35 million (13,000 sq km * $315/sq km). This cost estimate includes purchasing commercial high-resolution satellite imagery, producing the actual benthic habitat map from the imagery, and completing an independent thematic accuracy assessment of the map. Because of the technical and logistic challenges

and financial costs associated with imagery collection and map production, it is anticipated that four (4) or more years will be required to complete shallow-water benthic habitat maps of southern Florida.



The MIP also recommends developing bathymetry maps of priority locales in southern Florida as opportunities develop. The MIP presents estimates of the cost to generate bathymetry maps. Using the approximately 13,000 sq km area of the identified priority areas (Figure 1), the estimated cost to generate detailed shallow-water bathymetry using ship-based multibeam sonar is approximately $66 million (13,000 sq km * $5,100/sq km). The estimated cost to generate similar bathymetry using aircraft-based LIDAR (Light Detection and Ranging) is approximately $7.6 million (13,000 sq km * $585/sq km; 4 m X 4 m data postings). These estimates do not include the actual cost of transforming the bathymetry data into benthic habitat maps.

Next Steps

Several critical activities should be initiated in the next few months as the mapping project gets underway. First, there is a need to develop a hierarchical, sensor-dependent, benthic habitat classification scheme for the southern Florida coral ecosystems. Several schemes exist and may require only minor modification, based on the strengths and weaknesses of the technologies that will provide the imagery used to generate the maps. The MIP indicates that the user community wants southern Florida coral ecosystems maps that have 85-95 percent thematic accuracy, depending on the type of benthic habitat being characterized. The MIP also indicates that map accuracy is of greater importance than map detail. If choices must be made between accuracy and minimum mapping unit (the size of smallest benthic habitat feature identified), the priority is on map accuracy.

Second, there is a need to identify and ensure financial resource commitments to the mapping effort from federal, state, academic, and private sector partners. No single organization has the financial resources to complete coral ecosystem and bathymetric maps of southern Florida. Also, these financial commitments will need to be maintained for the estimated four or more year duration of the mapping effort. The state, federal, and acedemic institutions currently collecting information in the southern Florida area will need to coordinate their efforts and leverage financial commitments and investments.

Third, the county, state and federal agencies involved in conservation and management of southern Florida coral ecosystems will need to fully coordinate mapping-related activities. For example, the Florida Fish and Wildlife Conservation Commission is developing a GIS-based, internet mapping information inventory to better coordinate efforts. Also, NOAA is setting up a website for posting status reports, exchanging information, providing input, and tracking progress.

For more information about either the MIP or the southern Florida shallow-water coral ecosystem mapping project, please contact either:

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